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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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Darian Muresan

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EXAMINER

HSU, AMY R

ART UNIT

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PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/752,462	MURESAN, DARIAN	
	Examiner	Art Unit	
	AMY HSU	2622	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on ____.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-19, 26 and 27 is/are pending in the application.
- 4a) Of the above claim(s) ____ is/are withdrawn from consideration.
- 5) ☒ Claim(s) 3-7, 10-13 and 16-19 is/are allowed.
- 6) ☒ Claim(s) 1-2, 8-9, 14-15, 26-27 is/are rejected.
- 7) ☐ Claim(s) ____ is/are objected to.
- 8) ☐ Claim(s) ____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on ____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. ____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. ____. |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date ____. | 6) <input type="checkbox"/> Other: ____. |

DETAILED ACTION

Response to Arguments

1. Applicant's arguments filed 4/25/2008 have been fully considered but they are not persuasive.

Regarding applicant's argument that Kohashi (US Patent No. 6642960) does not disclose, teach, or suggest at least "calculating ... interpolation errors..." as recited in claim 1 and that Kohashi discloses forming and comparing patterns to determine an edge configuration, examiner respectfully asserts that Kohashi teaches a method which involves forming and comparing patterns for the purpose of determining errors in interpolation. Kohashi does not use the same terms or words as the applicant's claims such as "calculating... interpolation errors..." However, the purpose and end result of the disclosed method in Kohashi is for calculating interpolation errors as will be further explained with reference to the Kohashi patent. In Col 13 Lines 53-56, Kohashi teaches that the defect compensation according to the invention attempts to interpolate by inferring what type of component of image configuration in its surrounding region a fault pixel belongs. For example in Fig.1A, there is a defect pixel 101. The pixel could be white as its bottom neighboring pixel is, or it could be gray as its upper neighboring pixel is, and the method disclosed by Kohashi is used to determine what the defect pixel should be. The method of Kohashi is to interpolate by comparing which direction is the correct direction to interpolate. If the defect pixel used pixels in a vertical direction surrounding itself, it would use the upper gray pixel and the lower white pixel which are not the same and means this is the incorrect interpolation direction, and therefore is an

interpolation error if used. Another possible pattern is to use the surrounding pixels in a horizontal direction with respect to the defect pixel, specifically the pixels to the left and right which are both gray, which is what the defect pixel should be and is therefore a correct interpolation direction. This is disclosed in Cols 13 and 14. Therefore by forming and comparing patterns of direction of surrounding pixels to be designated as interpolation pixels, the method of Kohashi is calculating interpolation errors in an attempt to find the direction that will not result in an interpolation error. Further, to define what qualifies as an interpolation error, Col 14 Lines 34-35 teaches that the signal levels of two pixels that will potentially be used as interpolation pixels are compared to see if they are the "same", or more specifically if their difference is within $\pm 12.5\%$. Therefore Kohashi calculates if pixels in a certain direction surrounding the defect pixel are the "same", and if not it is an interpolation error.

Secondly, applicant argues that Kohashi does not disclose, teach, or suggest at least "selecting a direction indicated by a minimum of the EW error and the NS error as the edge direction" as recited in claim 1, nor "determining a minimum of calculated interpolation errors." Similarly to the discussion above and in reference to Columns 13 and 14, Kohashi finds the minimum error between the various directions. As in the example of Fig. 1A, comparing the pixels in the EW direction with respect to reference number 101, with the pixels in the NS direction will find that the error, which is the difference between the signal levels of the pixels in the EW direction are more minimal than the NS direction and is therefore the chosen interpolation direction.

Therefore, because of the explanation above, examiner respectfully maintains that Kohashi discloses a method for determining from an edge direction, interpolation errors in various directions and chooses the direction of minimal error to complete interpolation of an unknown or defect pixel. Examiner maintains the previous non-final rejection which follows.

Claim Rejections - 35 USC § 103

2. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

3. Claims 1-2, 8-9, 14-15 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kohashi et al. (US 6642960).

Regarding Claim 1, Kohashi teaches a computer-implemented method (*one of ordinary skill in the art recognizes that a defect pixel interpolation algorithm is performed by a computer implemented method*) for determining from a sampled image (*Fig. 18 shows an example*), an edge direction (*Fig. 9 and Col 15 line 10 "edge configuration"*), the method comprising: calculating for a fault pixel, interpolation errors in an East-West (EW) direction at known neighboring pixels, and averaging the EW interpolation errors to obtain an EW error; calculating for the fault pixel, interpolation

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errors in a North-South (NS) direction at known neighboring pixels, and averaging the NS interpolation errors to obtain a NS error; and selecting a direction indicated by a minimum of the EW error and the NS error as the edge direction (*Fig. 9 and Col 15 Lines 4-10*). The method is explained for a fault pixel, not specifically a green missing pixel.

Another embodiment of Kohashi in Fig. 18 shows the sample image is from a CFA with each pixel representing R, G, or B. Col 19 Lines 29-35 teaches the a missing green pixel, (*fault pixel G43*) where the edge configuration is determined based on neighboring known green pixels as seen in Fig. 18.

It would have been obvious to one of ordinary skill in the art at the time of the invention to modify the teaching of Kohashi to apply the edge configuration determining method to a color pixel array because in a color image, pixels of the same color are placed at every other location and four pixels can be treated as one fault pixel and the pixels can be uniformly compensated.

Regarding Claim 2, Kohashi teaches the method of claim 1 wherein the selected edge direction, the sampled image, which includes a green channel (G) of green pixels, a red channel (R) of red pixels, and a blue channel (B) of blue pixels (*Fig. 16*), are used to interpolate missing green pixels at red and blue locations in the green channel by: for the missing green pixel, interpolating a difference image comprising the G-B if the missing green pixel is in a blue location (*Fig. 20*), or G-R if the missing green pixel is in a red location (*Fig. 19*), in the selected edge direction; in the blue channel, estimating

missing blue pixels in green pixel locations using linear interpolation of the blue pixels in the blue channel in the selected edge direction; and in the red channel, estimating the missing red pixels in blue pixel locations using linear interpolation of the red pixels in the red channel in the selected direction, thereby providing an interpolated full green channel in which all missing green pixels have an interpolated value (*same can be applied to the red and blue channels*).

Claims 8-9 are computer-readable medium of the methods of claims 1-2 and are therefore similarly rejected.

Claims 14-15 are apparatus claims of the methods of claims 1-2 and are similarly rejected.

Regarding Claims 26 and 27, Kohashi teaches the computer-implemented method of claim 1, and teaches that the average of the pixels is used for interpolation (*Col 14 Lines 10-12*) when calculating the patterns. Each pixel, and each direction of comparison can be considered interpolation error until the direction of least error is found. Kohashi does not go into how to take an average of more than one representative, however official notice is taken that taking an average in terms of summing the parts and dividing by the total of the parts is basic math, and also it is the designer's choice of other methods of taking an average such as summing all the representatives in order to consider the whole. It would have been obvious to one of ordinary skill in the art at the time of the invention to modify the teaching Kohashi by

taking the average by one of the above methods of averaging because those methods would be obvious to try in an attempt to take an average.

Allowable Subject Matter

4. Claims 3-6, 10-13, and 16-19 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.
5. Claim 7 allowed. Examiner has currently not found prior art teaching the detailed method for obtaining corrected high density color channels claimed in Claim 7.

Conclusion

6. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

7. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Amy Hsu whose telephone number is 571-270-3012. The examiner can normally be reached on M-F 8am-5pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Lin Ye can be reached on 571-272-7372. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

Amy Hsu
Examiner
Art Unit 2622

ARH 7/17/08

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/Lin Ye/

Supervisory Patent Examiner, Art Unit 2622